



User Manual

Star Walk™

for iPhone/iPod Touch/iPad

October 2013, ver. 7.0

Table of Contents

1 Introduction	3
2 Getting started	4
2.1 Sky Live window	4
2.2 Location set up	5
2.3 Using/Activating Star Spotter	7
2.4 Augmented Reality	8
2.5 Spectrum Bar	8
2.6. Stargazing Community	9
2.7 Display/Interface	10
3 Menu	12
3.1 Day and Night color schemes	12
3.2 Constellations display	12
3.3 Satellites	13
3.4 TelRad	13
3.5 Playing sounds	13
3.6 Playing music	13
3.7 Magnitude adjustment	13
4 Using functions of Star Walk™	13
4.1 Changing date and time	13
4.2 Getting information about an object	14
4.3 Searching for sky objects	16
4.4 Watching astronomical events	16
4.5 Using Astronomy Pictures	18
4.6 Posting pictures in Star Walk™	21
4.7 Sharing	21
4.8 Watching moon phases	22
5 Star Walk™ on a big screen using cables	23
6 Star Walk™ on a big screen using AirPlay	23
7 The Apple Volume Purchase Program	24
FAQ	25
Glossary	26

1 Introduction

Star Walk™ is a stargazing application for amateurs, professionals, and kids who are eager to learn. The app allows users to identify about 250,000 heavenly bodies and learn about them, watch moon phases, meteor showers, see daily sunset and sunrise times, elevation angle, and daily hours of sunlight as well as the data for all main planets.

Star Walk™ is an excellent guide to the world of astronomy that allows you to learn the secrets of our Universe just sitting comfortably in the arm-chair or during stargazing outside. With Star Walk™ you can see the following object/events:

- Stars and constellations
- Solar system bodies (planets, the Sun, the Moon, dwarf planets, asteroids, comets)
- Deep Space (nebulae, galaxies, star clusters)
- Satellites
- Meteor showers, equinoxes, conjunctions, full/new Moon and etc.

Star Walk™ has many useful and easy-to-use features:

Star Spotter shows the sky as seen in reality and follows the moves of the user.

Augmented Reality allows users to point-and-display the sky as on any device with digital compass.

Spectrum Bar - ability to view the night sky in different spectrums.

Calendar allows you to search for celestial events without leaving the app.

Community allows you to send and read Tweets from other Star Walk™ users on the globe, reply to them and communicate with each other.

TelRad for pro astronomers – ability to connect a secondary display along with new content additions.

Time Machine extends control of star viewing into the past and future. Once activated, a panel drops down and you can rapidly flip through time.

Search allows you to search for any planet, constellation, messier object, satellite, or star you are interested in and see it on the sky.

Moon phases displays the moon phases for a chosen period.

Cutting-edge graphics – smooth and eye candy colors, icons, pictures that make the use of Star Walk™ a real pleasure. FPS is high (30 frames per second).

Night mode – nighttime setting shifts the graphics to red tones.

Information gives a full pack of information along with the media on chosen object and provides an access to Wikipedia pages.

Astronomy pictures – a gallery of beautiful celestial pictures collected with ESA and ESO.

Sharing allows to take a screenshot for sharing via Twitter, Facebook, Instagram or e-mail, save it to your camera roll. Also users will be able to rate or gift Star Walk™ through the App Store.

Star Walk™ is currently available in the following languages: English, Chinese, Dutch, French, German, Italian, Japanese, Korean, Russian, Spanish.

The application is compatible with iPhone, iPod touch (4th and 5th generations) or iPad, requires iOS 4.3 or later.

[Go back to Table of Contents.](#)





2 Getting started

To launch Star Walk™, click on its icon on your touch screen. The program will load and it can take up to 10 seconds to open.

2.1 Sky Live window

Sky Live window presents information about sunrise and sunset times, daylight hours, and elevation angle. You can also see moon phases, elevation angle, rise and set times for 4 main planets: Venus, Mercury, Saturn, and Jupiter so you will never miss what is happening on the sky.




To open Sky Live window, go to Menu and choose Sky Live . To see information for the following or past days, tap the arrows   at the top of the window. To close Sky Live window, tap  on the upper left corner.

2.2 Location set up

There are two possibilities to set up location in Star Walk™: manual selection and automatic selection.

2.2.1 Automatic selection

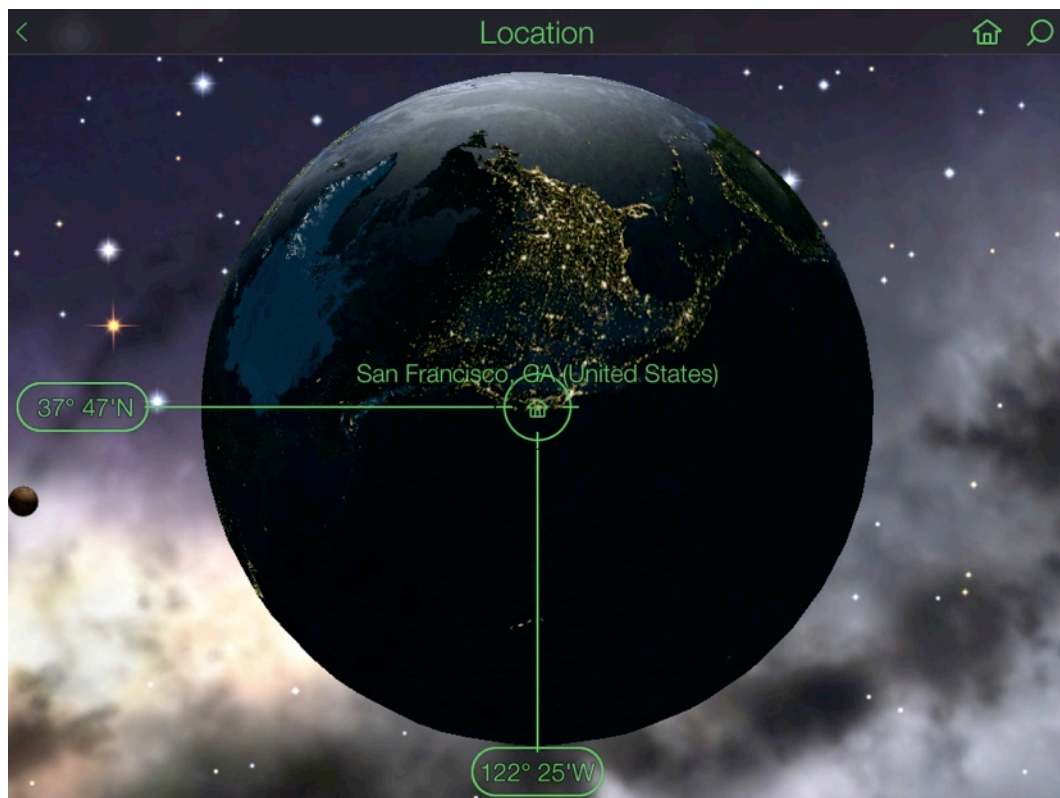
When Star Walk™ application is launched for the first time or opened after an update, it asks for the permission to use your current location. It also uses the current time and date, but this can be easily changed by tapping the Time Machine icon  in the upper right corner. To determine location automatically Star Walk™ uses Wifi, GPS, and GSM towers.

Note: The iPod Touch does not have built-in GPS-receiver. It can sometimes use WiFi to have the location set. If the device still fails to set the location, use manual selection. Tap OK if you want Star Walk™ to determine your location automatically. If the app fails to determine your location automatically or you tap Don't Allow, do it manually.


2.2.2 Manual selection

With manual selection of location you can choose any place you like: Stockholm, Vienna, Sidney, or North Pole. You can observe the sky from wherever you like. After choosing the location you can explore the sky on your iPhone as if you were there physically.

From the Menu choose Settings. Then tap on the name of current city. It opens a window which allows you to choose the desired location and see its latitude and longitude opens.



You can set or edit your location either by:




- Spinning the globe
- OR-
- Using Search function 

Note: Star Walk™ application does not automatically update time zone for the selected city.

2.2.2.1 Spin the globe

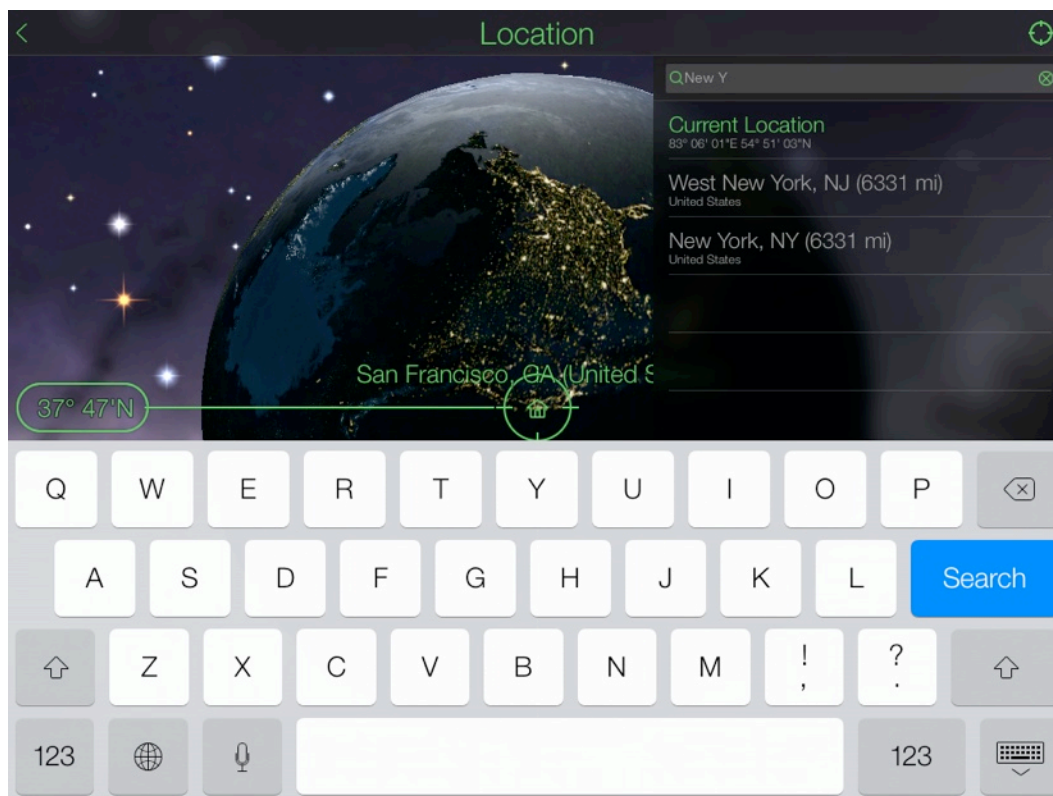
By spinning the globe with your fingers in any direction you can find the location you need.

To find the location by spinning the globe you need:

1. Spin the globe until you see the desired location.
2. Tap Set Home Location  in the upper right corner of the screen. This button will change to the Current Location button .
3. To return to the night sky, tap the arrow .

2.2.2.2 Search location function

The Search Location function allows searching for location by browsing through the list of cities or using a standard search window and keypad.



To find the location using the Search Location function:

1. Press Search in the upper right corner of the screen.

2. Choose the desired location from the list and tap it,
OR
3. Enter the desired location name in the search window.

Note: To use the current location, either tap Current Location , or choose Current Location from the list.

2.3 Using/Activating Star Spotter

If you have an iPhone 3GS/4/4S/5/5s/5c, iPad or iPad mini, tilt your device and the Star Spotter function will be activated. Star Walk™ uses the digital compass to learn which way you are looking. A live representation of what you see in the sky will appear on your display and the sky will start following your movements whether you move up or down, left or right. To turn off this function, simply tap the display.



Note: If you do not have an iPhone 3GS or later, iPad or iPad mini use your fingers to change the view of the sky map.

For better functioning of the digital compass consider doing the following:

- 1) Tilt your device from landscape to portrait orientation several times. This will help the digital compass recalibrate itself and calculate current position.
- 2) Make sure the compass is not obstructed by thick walls of buildings or large amounts of metal nearby. Try going outside.
- 3) Consider trying again later. Sometimes it is unclear what may be influencing the magnetometer.



2.4 Augmented Reality

Star Walk™ allows you to use your iOS device camera for Augmented Reality feature. To activate this feature just tilt your device towards the sky and tap the  icon. Instantly, the image from your camera will be overlaid with the app-generated sky, allowing you to literally know what is right above you. To go back to the night sky tap the  icon.

Note! Augmented Reality feature was designed for iPhone 4/4s/5/5s/5c, iPod Touch (4th and 5th generations), iPad (except for iPad 1st generation).



2.5 Spectrum Bar

Star Walk™ allows you to see the night sky in different spectors easily sliding on the scale on the left side. You can switch this option off from the Setting in Menu. Settings --> Spectrum Bar --> Off.




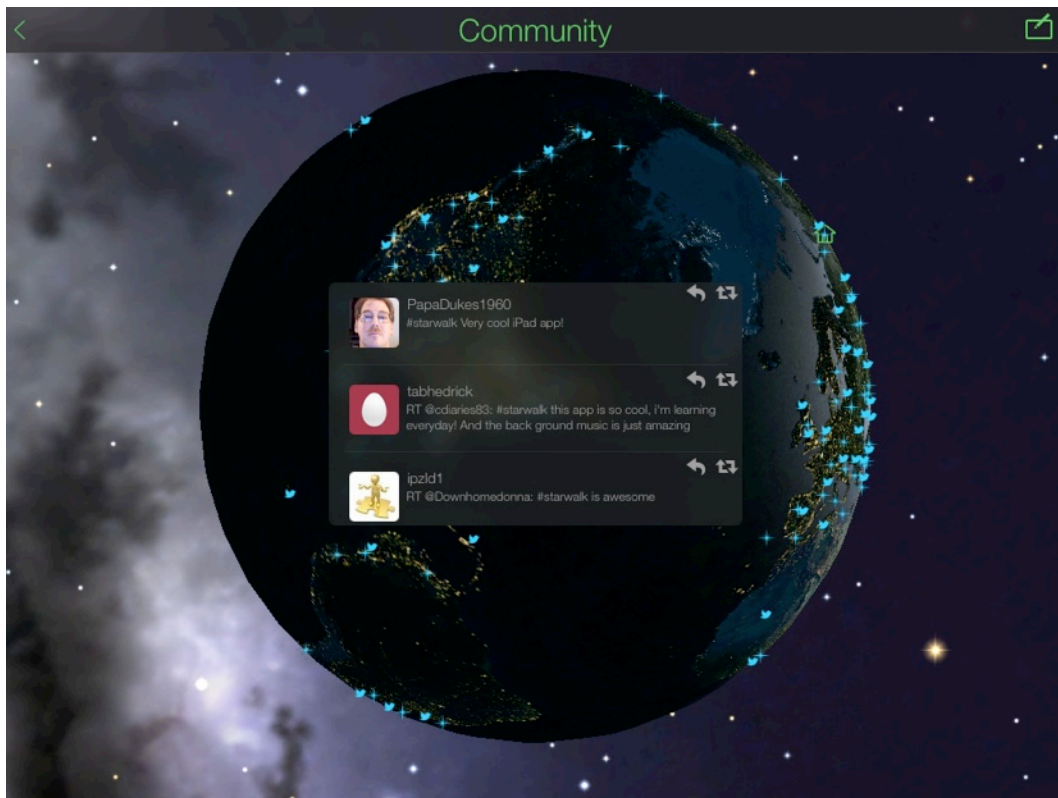
2.6. Stargazing Community

Star Walk™ invites users to join a Stargazing community uniting all Star Walk™ tweeting friends from around the world.

To participate in Stargazing Community allow Star Walk™ to share your location. You can later turn this off in the System Settings.

Location Sharing is used to display your Tweets on the globe. It gives other Star Walk™ users a very rough approximation of your whereabouts (+/- 70 miles). When disabled, you can no longer post Tweets in Star Walk™ Community.

1. Go to your iDevice's System Settings.
2. Tap on Twitter and sign in with your existing Twitter account or create a new one.
3. When asked in Star Walk™ to allow to use your current location, tap "Allow". You can later turn this off in the Location Services in System Settings.
4. When asked in Star Walk™ to share your current location and access your account, tap "Allow". You can later turn this off in System Settings.
5. To write a new Tweet, tap the icon in the top right .










2.7 Display/Interface

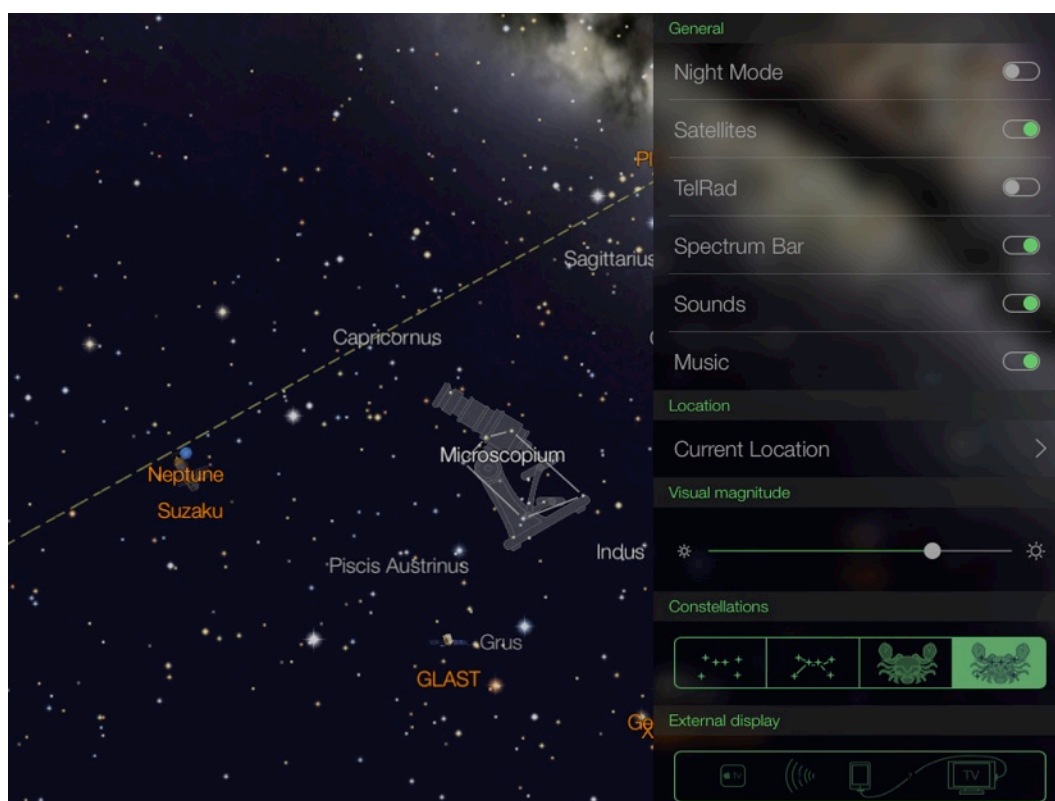
Star Walk™ has an intuitive touch screen user interface. To navigate around the map use the following gestures:

- Touch and Drag. Drag your finger around to move quickly across the sky. Drag up and down to adjust the viewing elevation. Drag from side to side to adjust the viewing azimuth (compass viewing direction).
- Pinch. Use to zoom in and out the map.
- Double Tap. Use to zoom out the map.
- Tap with two fingers. Use to zoom in the map.

The map has markers for North, East, South, and West to make it easier to look for specific star/constellation. The program functional buttons are placed in the corners of the screen.

Icon	Name of the icon	Function
	Menu	Has a list of all the application's functions such as Calendar, Help, Settings, Gallery, Community , Sky Live.
	Search	Allows you to find any star, constellation, Solar system body (the planets, the Sun, the Moon), Deep Space object or satellite.







Icon	Name of the icon	Function
	Information	Appears when you select any celestial body on the screen. By tapping this icon you may read basic info about the body. If the body is large enough (the planet, big star, Messier object, or constellation) there will be a link to Wikipedia article about this object.
	Time Machine	Opens time panel that allows changing the year, month, date, and time. Once tapped Time Machine extends.
	Augmented Reality	Allows you to know what is right above you, using the image from your camera, which is overlaid with the app-generated sky.
	Calibration	Makes the stargazing more precise by calibrating the compass.
	Night sky	Disables Augmented Reality feature and brings you back to the night sky in the app.



[Go back to Table of Contents.](#)

3 Menu

Menu gives access to all the functions of the application. From the Menu you can call the main features and settings.

Icon	Icon name	Function
	Calendar	Allows you to choose any celestial event and go directly to it
	Sky Live	Gives data about sunrise/sunset times, daylight hours, moon phases, rise/set times for Venus, Mercury, Saturn and Jupiter.
	Gallery	Allows looking for a Picture of the Day provided with an interesting information.
	Community	Allows you to send and read Tweets from other Star Walk™ users on the globe, reply to them and communicate with each other.
	Settings	Allows you adjust brightness of the map, switch on/off the sound and constellations display, and change the map color schemes to day/night.
	Help	Gives basic information on how to use main features. Also you can find there FAQ and Contact us information.

3.1 Day and Night color schemes

The application has two modes to use: day and night. By default day mode is set but you can change that anytime. Switching to night mode helps make your experience with stargazing more comfortable for the eyes. When using Star Walk™ in the dark, enable the night mode switcher to let your eyes relax. Night mode turns the map interface into a reddish color which is the best for night vision. To switch to the night mode, from the Menu choose Settings -> Night Mode and tap OFF.

3.2 Constellations display

Constellations switcher allows switching on and off the constellation lines and shapes. This lets you see the sky not overloaded with extra shapes. To switch off the constellation images or/and lines, from the Menu choose Settings -> Constellations and choose the view you would like to have.

Note: Pictures of constellations become visible when their names are centered or tapped.

3.3 Satellites

Satellites switcher allows switching on and off satellites in the sky among the stars. This option lets you figure out whether that white dot in the sky is a star or a satellite and exactly which star or satellite it is. It lets you find out exactly when the ISS will be flying over your head and where in the sky you should look for it.

3.4 TelRad

This option lets you use TelRad that measures angular distance between nearby stars and helps to find celestial objects with a telescope.

3.5 Playing sounds

A sound switcher mutes noises made by the application. To disable sounds, from the Menu choose Settings - > Sounds and tap OFF.

3.6 Playing music

A music switcher mutes music made by the application. To disable music, from the Menu choose Settings -> Music and tap OFF.

3.7 Magnitude adjustment



The brightness slider lets you adjust magnitude of stars, planets and other night objects so you can leave only those you can see with the naked eye. You can make only the brightest stars visible or slide down until even the faintest stars appear. To adjust brightness of night objects, from the Menu choose Settings and move the slider forward and backward until you get the desired result. As you move the slider, the sky map will change accordingly.

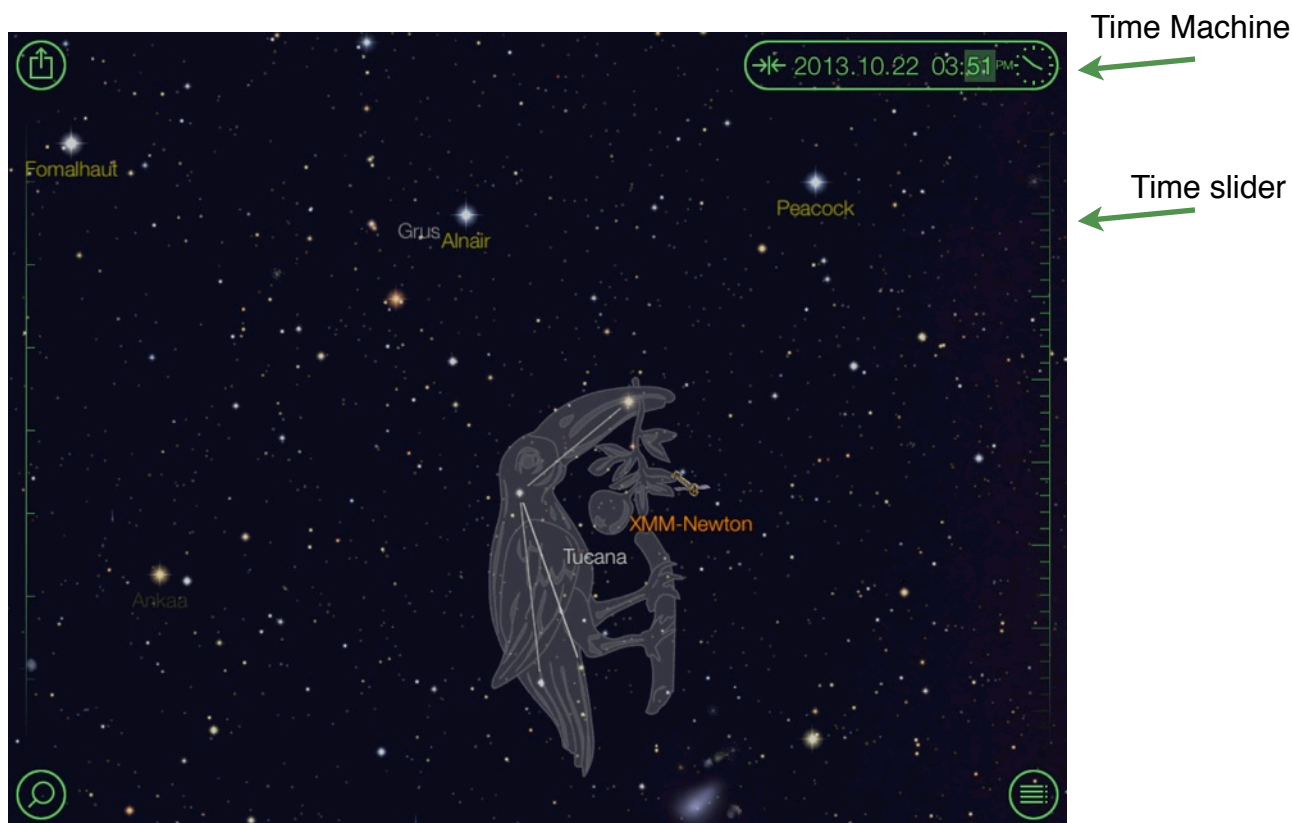
[Go back to Table of Contents.](#)

4 Using functions of Star Walk™

4.1 Changing date and time

Star Walk™ has the Time Machine feature that allows changing year, month, day, and time to see how stars and planets were aligned in the future or past. You can virtually travel through the time and see stars, constellations, and celestial events through the eyes of our ancestors or descendants. For example, you can watch the starry sky the day you were born or observe a solar eclipse that will take place in a century. You can also select an earlier date and see how the sky is changing from the selected date to the present.

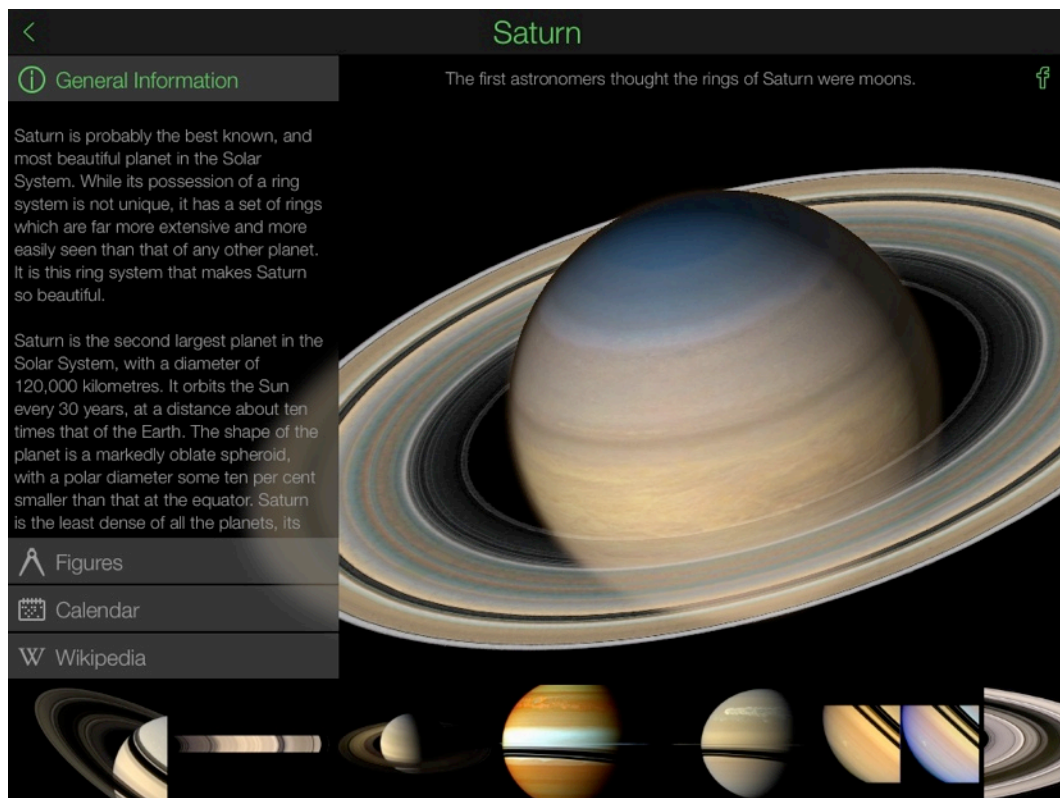
The Time Machine feature is placed in the upper right corner of the screen. In order to maximize it, just tap  button. To change the year, month, date, or time, tap the parameter you want to be different and drag the Time slider up or down with your finger. The highlighted parameter will start changing accordingly. To make any parameter elapse automatically, tap one of them and drag the Time slider. The map sky will rotate. In order to stop that, tap the Time slider again. To return to the current time zone, tap .





[Go back to Table of Contents.](#)

4.2 Getting information about an object


Star Walk™ includes many astronomy related data about celestial bodies, pictures, and events. For example, if you select Jupiter, you can see some basic facts about it (surface area, volume, average distance from the Sun, and short interesting facts).



To learn more about a particular object such as a star, constellation, or planet, tap it on the screen. A green circle with a name of the selected object appears around it. Tapping  displays more data about the object and lets you enjoy a closer view. A Wikipedia button is displayed in the information field. Tapping this button leads to a Wikipedia article on the subject. To go back to the night sky, you need to tap .


[Go back to Table of Contents.](#)

4.3 Searching for sky objects

The application has the Search feature  that allows searching for sky objects in any place. For example, you would like to find a meteor shower “June Bootids” and watch it. Tap Search and find the desired name. Then go back to the night sky, set Time Machine and enjoy it.

The Search feature allows you to switch between the following categories:


- Stars and constellations
- Solar system - includes planets, the Moon, the Sun, meteor showers, dwarf planets, asteroids, comets
- Deep space – includes clusters, nebulae, galaxies, clouds
- Satellites

Each category has a list of objects and events. If the object is visible to you, its name is in white, if not – dimly lit. To read some facts about the object of interest, tap  .



[Go back to Table of Contents.](#)

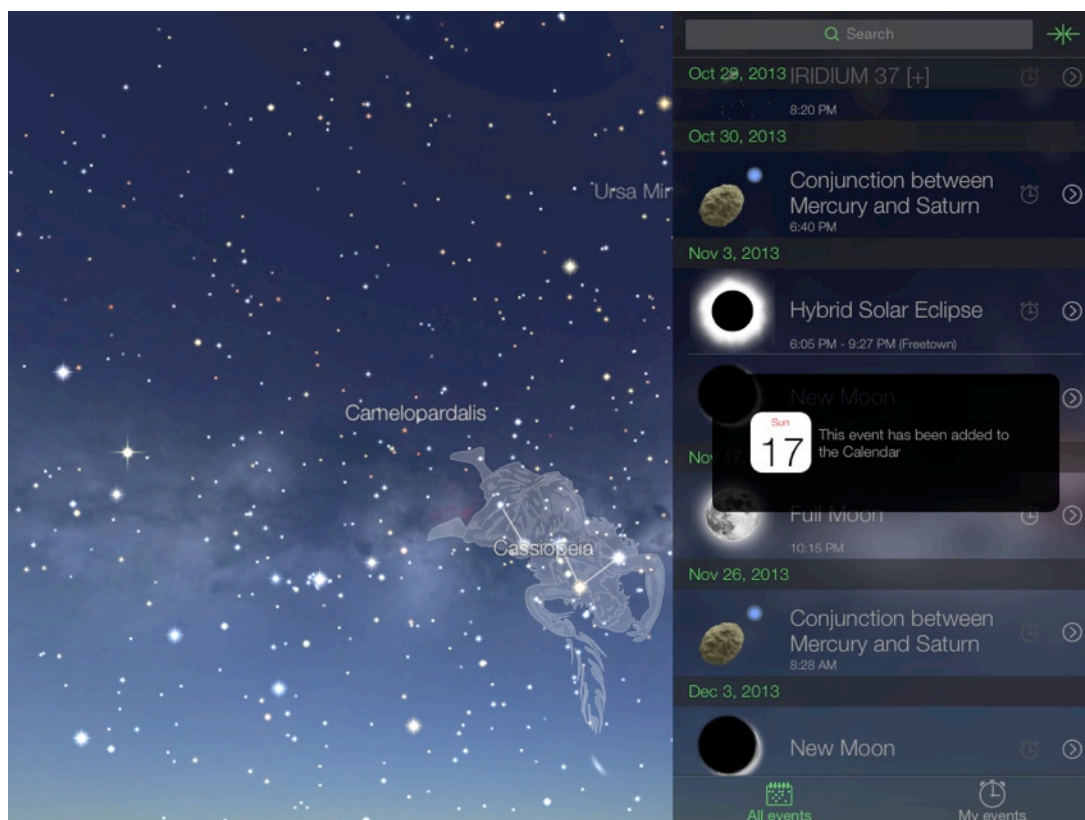
4.4 Watching astronomical events


Star Walk™ can be used for watching various celestial events including meteor showers, solar/ moon eclipses, new moon, full moon, occultations, oppositions, conjunctions, and other notable events by both mature and novice astronomers. Just tap the  button

from the menu button and choose any event you want to watch on the night sky. The app will move you to this event.




Tapping  you can get information about a chosen event.

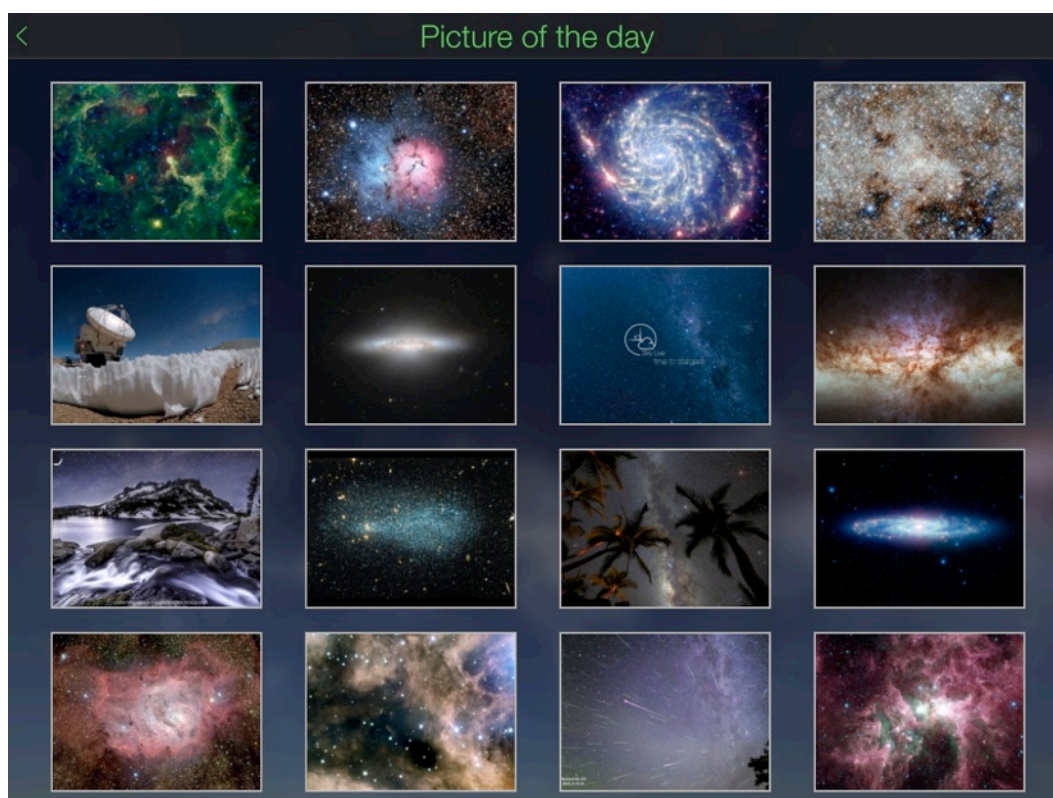
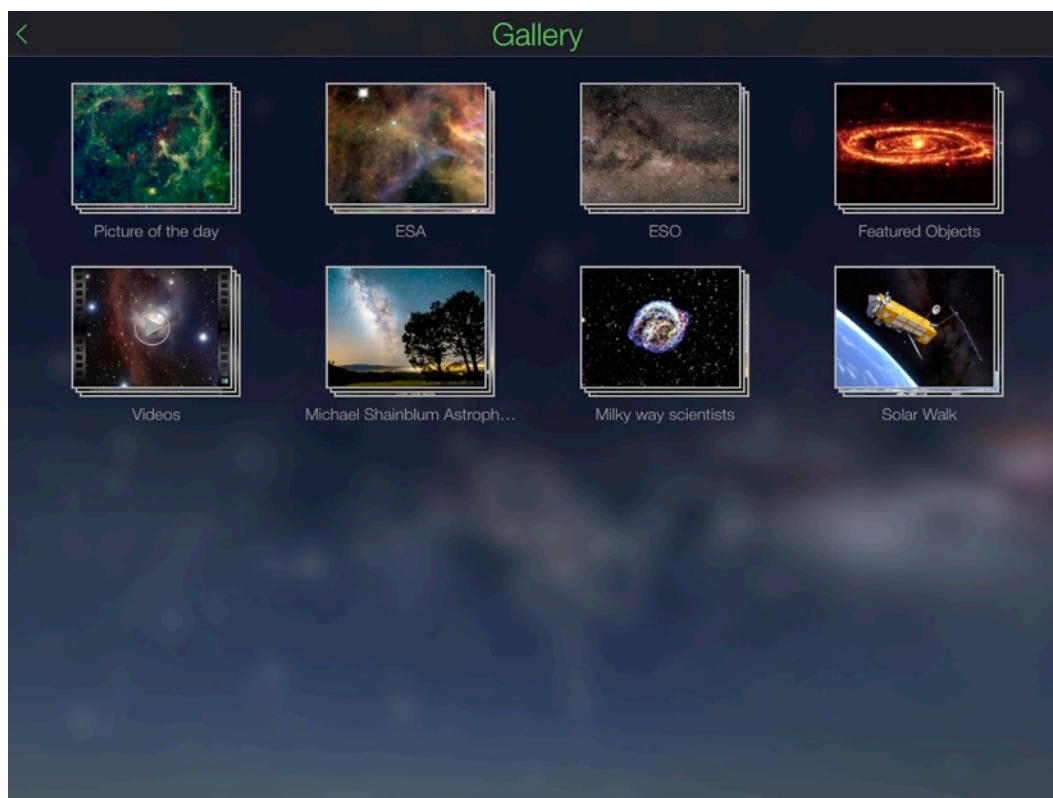





Each event can also be added to My events by tapping an Alarm clock icon . The event will also be added to the Calendar of your device. You will get a notification about the event when it occurs. To remove the event tap Alarm clock icon to delete it from the Calendar of your device.






[Go back to Table of Contents.](#)

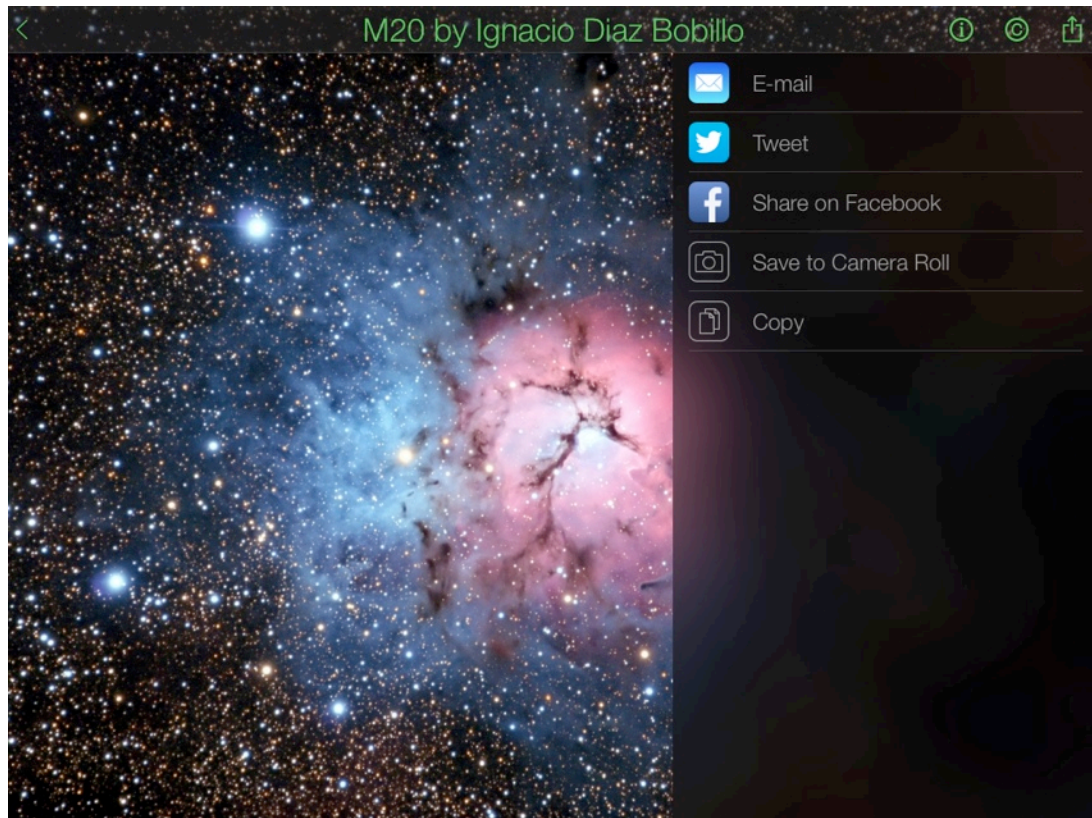
4.5 Using Astronomy Pictures

Star Walk™ provides users with beautiful Astronomy pictures. To go to a gallery of the pictures go to the Menu and tap , where you will find a few albums with pictures from different sources.

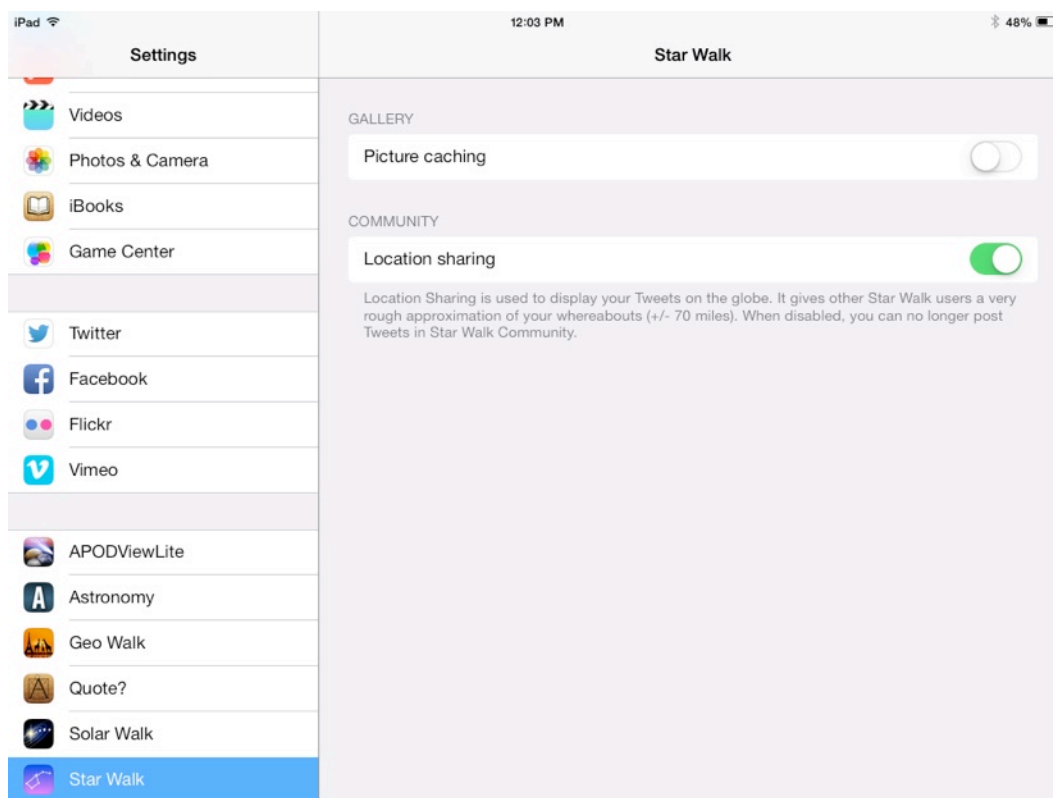


In the top menu you can find three buttons. The first button opens the information window, the second one gives you a link to the original source. The Sharing button  opens a pop-up window. The  and  buttons post selected picture on your Facebook page

and on your Twitter account respectively. Tapping  button you can send the picture via e-mail. The button  saves the picture to the photo folder on your device. When you tap  button the app asks you if you want to switch to Safari and it opens the page with more information. Tapping  you go back to the gallery. When you tap  you will get an information window with a short description.



Pictures change 3 times a week automatically. You will get push notifications whenever a new picture is added and see a badge with a number on Star Walk™ icon. To disable notifications for picture of the day iPhone Settings=> Notification center => StarWalk=> Alert style=>None and Badge App Icon=> Off. To switch off picture caching go to Settings=>StarWalk=>Gallery=>Picture caching=>OFF. This setting will put the pictures in the “Temp” folder which will be emptied by the system.



4.6 Posting pictures in Star Walk™

If you want to have your astronomy picture appear in Star Walk™, follow these guidelines:

1. Choose a name for your picture.
2. Write a small paragraph about the celestial object on your picture (its peculiarities, details).
3. Write your full name and link to your website (if any) for credit.
4. Make sure your picture is at least 1024x768 and send it to anna@vitotechnology.com.




Note: Pictures of the Day cannot be deleted manually. However, after their number on the device reaches 20, old ones are deleted automatically so they will never overload your device. To keep the picture you like, save it to Photos.


4.7 Sharing




Star Walk™ allows users to share their favorite snapshots via Twitter, Facebook, Instagram, e-mail or save them to Camera roll. Also users will be able to Gift or Rate Star Walk™ through AppStore right from their iPhone or iPad.

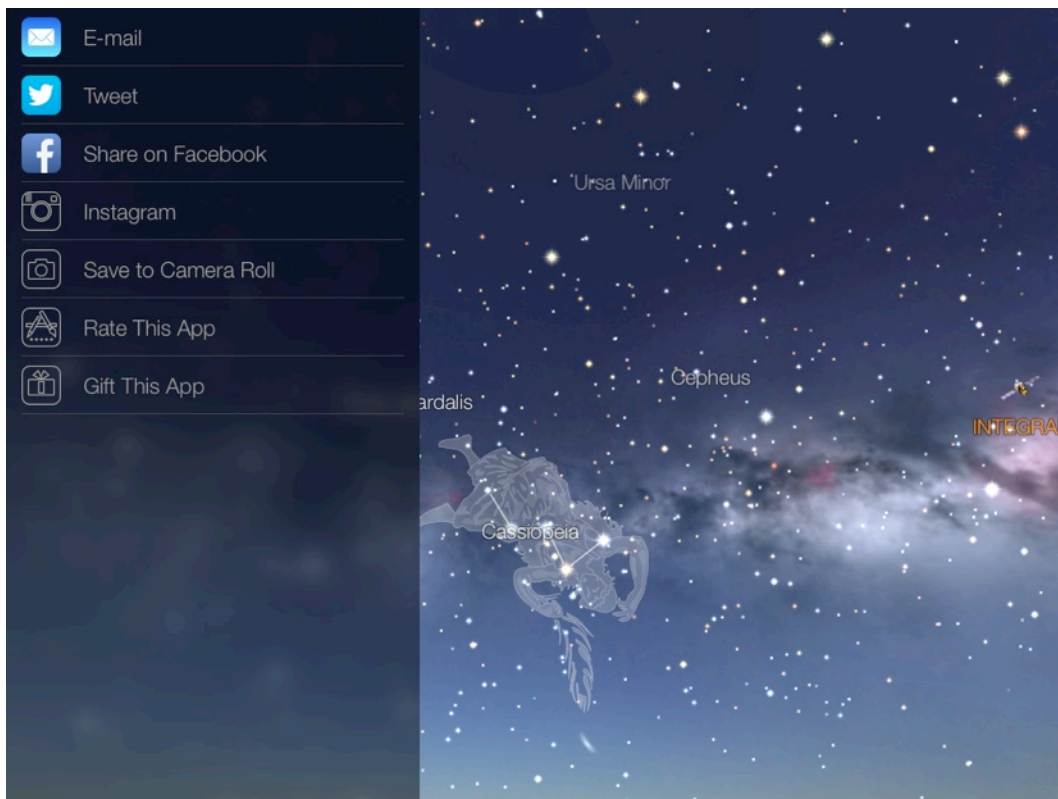
To take a screenshot:

1. Select an object on the screen.
2. Tap the Sharing button at the upper left.

To share your screenshot use ,  or  buttons for posting it on your Facebook page, Twitter or Instagram accounts. You can bookmark an amazing star you liked and

look for some extra information on it later. By tapping  you can send a picture of a celestial event to your friend and offer to observe it together from different corners of our

planet. When you tap  your bookmark is saved to your photos. Also you can Rate  or Gift  Star Walk™ through the App Store.



[Go back to Table of Contents.](#)

4.8 Watching moon phases

Star Walk™ lets you watch moon phases and get information on the Moon including radius, mass, density, etc. The Moon looks different every night and you can see it changing over a month in the animation mode.

For more information on Time Machine, see [Changing date and time](#).

Did you know: The Chinese originally used a lunar calendar system to determine the best times to plant, harvest, and hold their many religious festivals.

[Go back to Table of Contents.](#)

5 Star Walk™ on a big screen using cables

To mirror Star Walk™ on your HDTV or HDMI-compatible display you need to connect the Apple Digital AV Adapter to your iOS device (iPad, iPhone 4/5/5s/5c, iPod touch (4th and 5th generations) via the 30-pin dock connector and to your HDMI-compatible display using an HDMI cable.


Also you can mirror Star Walk™ using the Apple VGA adapter which connects to your iOS device (iPad, iPhone 4, iPod touch (5th and 4th generations), iPad Dock or Universal Dock via the dock connector and to your projector or display using the VGA adapter.

To connect any iOS device (iPad, iPhone/3G/3GS/4/5/5s/5c, iPod touch 1st/2nd/3d/4th generations) you need the Component AV Cable which connects to your device or Universal Dock via the 30-pin dock connector and to your TV, home theater receiver, or stereo receiver via the component (Y, Pb, and Pr) video and red/white analog audio ports.

[Go back to Table of Contents.](#)

6 Star Walk™ on a big screen using AirPlay

Also you can mirror Star Walk™ on an external screen using iOS 5 feature AirPlay.

1. Make sure your iDevice and Apple TV have been upgraded to the latest software.
2. Turn on Apple TV.
3. Tap  on iPad and select it from the list of available devices.
4. You're all set.

[Go back to Table of Contents.](#)

7 The Apple Volume Purchase Program

Star Walk™ participates in Apple's Volume Purchase Program, which means it is available to schools for bulk purchasing at a 50% discount.

It's quick and easy to set up school organization for volume purchasing.



1. Designate a person in the organization as the Program Manager.
2. Receive cards that are physically sent to the school. (Nothing is offered electronically.)



3. Sign up Program Facilitators, which will allow them to make purchases. Set up and manage your institution's list of Program Facilitators using the [Program Facilitator account manager tool](#). Apple will create a new Apple ID for each Program Facilitator to use exclusively in the VPP Education Store. Existing Apple IDs cannot be used for the Volume Purchase Program. For each Program Facilitator, you will need to provide Apple with a valid email address that isn't currently used as an Apple ID. An institution can have as many Program Managers as it wants.
4. Log in to the [Volume Purchase Program Education Store](#) with your new Apple ID. After login, you can redeem Volume Vouchers given to you by your Program Manager. You can also search for apps and books by name and purchase them in the quantity you need.

For any further questions, please visit [Apple web-site](#).

FAQ

Question	Answer
What is the tan dashed line?	This is the ecliptic.
What are the red lined circles?	Red lined circles are the zenith and the nadir.
What does Time machine do?	You can use Time Machine for changing date and time .
How can I switch off the push notifications for the Picture of the Day feature?	From General Settings of your device, choose Notification center-> Star Walk™-> Badges App Icon-> OFF.
How can I delete Pictures of the Day? They can overload my iPhone/iPod touch.	Pictures of the day are always changing.
How can I find a specific object in the sky?	Tap the Search icon and choose the object you need to find. A green arrow will appear on the screen to point you in the right direction.
How can I see in Star Walk™ only those stars that I see with the naked eye?	From the Menu choose Settings and move the slider forward and backward until you get the desired result. As you move the slider, the sky map will change accordingly.
How to measure angular distance between the nearby objects?	To do this you need to activate Telrad. Go to main Menu -> Settings -> TelRad -> ON.
How to calibrate the compass?	To calibrate the compass, tap  that appears once you tilt your device towards the sky.
How to activate Star Spotter?	Tilt your device towards the sky to activate Star Spotter. To stop Star Spotter touch the screen.
How to activate augmented reality feature?	To activate augmented reality feature just tilt your device towards the sky and tap the  icon.
How to connect Star Walk™ to my HDTV or projector?	To mirror Star Walk™ on your HDTV or projector you need to use specific cables .

[Go back to Table of Contents.](#)

Glossary

Term	Definition
Above Horizon	the horizon (or skyline) is the apparent line that separates earth from sky, the line that divides all visible directions into two categories: those that intersect the Earth's surface, and those that do not.
Annular Solar Eclipse	occurs when the Sun and Moon are exactly in line, but the apparent size of the Moon is smaller than that of the Sun. Hence the Sun appears as a very bright ring, or annulus, surrounding the dark disk of the Moon.
Comet	an icy small Solar System body that, when close enough to the Sun, displays a visible atmosphere and sometimes also a tail.
Conjunction	occurs when two astronomical objects have either the same right ascension or the same ecliptical longitude, normally when observed from the Earth.
Constellation	one of the 88 patterns of stars in the sky, often named for a mythological god, hero, or animal.
Culmination	in astronomy, the culmination of a planet, star, constellation, etc. is the altitude (or elevation angle) reached when the object transits over an observer's meridian.
Dec (Declination)	the angular distance of a celestial object above or below the celestial equator; the celestial sphere equivalent of latitude.
Density	the amount of mass per unit volume of an object or region of space
Ecliptic	the plane of Earth's orbit around the sun; all the planets except Mercury and Pluto have orbits in nearly the same plane.
Eclipse	an event in which one body passes in front of another, blocking it partially or completely from view; a specific type of occultation.
Elevation angle/Altitude	the angle between the line from an observer or instrument to an object above the observer or instrument and a horizontal line.
Equinox	occurs twice a year (around 20 March and 22 September), when the tilt of the Earth's axis is inclined neither away from nor towards the Sun, the center of the Sun being in the same plane as the Earth's equator. The term equinox can also be used in a broader sense, meaning the date when such a passage happens.
Full Moon	a lunar phase that occurs when the Moon is on the opposite side of the Earth from the Sun. More precisely, a full moon occurs when the geocentric apparent (ecliptic) longitudes of the Sun and Moon differ by 180 degrees; the Moon is then in opposition with the Sun.
Galaxy	an enormous gravitationally bound assemblage of millions or billions of stars.
Gravity	the attractive force that all objects exert on one another; the greater an object's mass, the stronger its gravitational pull.
Horizon	the apparent line that separates earth from sky.
Hybrid Solar Eclipse	(also called annular/total eclipse) shifts between a total and annular eclipse. At certain points on the surface of Earth it appears as a total eclipse, whereas at other points it appears as annular.
Iridium Flare	is the phenomenon caused by the reflective surfaces on the Iridium communication satellites (such as antennas or solar panels) reflecting sunlight directly onto the Earth below and appearing as a brief, bright "flare".
Luminosity	the total amount of light that an object radiates per unit of time.
Lunar Eclipse	occurs when the Moon passes directly behind the Earth into its umbra (shadow). This can occur only when the Sun, Earth, and Moon are aligned (in "syzygy") exactly, or very closely so, with the Earth in the middle.
Magnitude	the measurement of an object's brightness; the lower the number, the brighter the object.
Messier objects	a catalog of 107 bright deep-space objects that belong to a catalog compiled by French astronomer Charles Messier in the 1700s
Meteor	a flash of light that occurs when a meteoroid burns up in Earth's atmosphere; also popularly known as a shooting star.

Meteor shower	a period of enhanced meteor activity that occurs when Earth collides with a swarm of meteoroids; an individual shower happens at the same time each year and has all its meteors appearing to radiate from a common point.
Milky Way	the band of light that encircles the entire sky and results from the combined light of billions of stars in our galaxy's disk.
Nadir and Zenith	the point on the celestial sphere directly over the head of an observer
Nebula	a cloud of gas and/or dust in interstellar space; some nebulae represent stellar nurseries, others represent stellar graveyards.
New Moon	in astronomy, new moon is the phase of the Moon when it lies closest to the Sun in the sky as seen from the Earth. More precisely, it is the instant when the Moon and the Sun have the same ecliptical longitude. The Moon is not normally visible at this time except when it is seen in silhouette during a solar eclipse.
Occultation	occurs when one object is hidden by another object that passes between it and the observer.
Opposition	happens when an outer object (asteroid, planet, comet, etc.) is directly in opposition to the Sun providing the best viewing of this object from the Earth.
Orbital Velocity	the minimum velocity at which a body must move to maintain a given orbit.
Partial Lunar Eclipse	occurs when only a portion of the Moon enters the umbra (shadow). When the Moon travels completely into the Earth's umbra, one observes a total lunar eclipse.
Penumbral Lunar Eclipse	a total penumbral eclipse is a lunar eclipse occurs when the moon becomes completely immersed in the penumbral cone of the Earth without touching the umbra (shadow).
Planet	a major object which orbits around a star. In our solar system, there are 8 such objects which are traditionally called planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
RA (Right Ascension)	the angular distance of a celestial object east of the vernal equinox; the celestial sphere equivalent of longitude.
Rise	the rising of a star (or other body such as the moon, a planet or a constellation) occurs when it first becomes visible above the eastern horizon after a period of time when it had not been visible.
Satellite	an object orbiting around another, larger one.
Set	the setting of a star (or other body such as the moon, a planet or a constellation) occurs when it sets below the western horizon and is no longer visible.
Solar system	the system containing the sun and all the smaller bodies in orbit around it.
Solstice	an astronomical event that occurs twice each year as the Sun reaches its highest or lowest excursion relative to the celestial equator on the celestial sphere. As a result, on the day of the solstice, the Sun appears to have reached its highest or lowest annual altitude in the sky above the horizon at local solar noon.
Spectral type	the designation of a star based on its spectrum, which is determined by its surface temperature.
Star	a large hot ball of gas which generates energy in its core by nuclear reactions.
Star	cluster a group of stars which are held together by their mutual gravitational attraction.
The closest approach	happens when there occurs the closest approach of two bodies (the point at which two bodies are the closest).
Total Solar Eclipse	occurs when the dark silhouette of the Moon completely obscures the intensely bright light of the Sun, allowing the much fainter solar corona to be visible. During any one eclipse, totality occurs at best only in a narrow track on the surface of Earth.
Zenithal Hourly Rate	the number of meteorites expected to be seen per hour when a meteor shower's radiant is at an observer's zenith; abbreviated ZHR.

[Go back to Table of Contents.](#)